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Evaluation of Desertification Control in Nigeria: Challenges and Constraints in Policy Enforcement

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Abstract

This paper critically examines desertification abatement measures in Nigeria and their related legal challenges. Nigeria, as a country richly endowed with abundant natural resources, both renewable and non-renewable, unfortunately, poverty and difficult socio-economic conditions are widespread, and as a result, many people are dependent on natural resources for their livelihoods. The objective of this paper is to examine the development of a land use systems that meet the needs of present and future generations without causing environmental degradation. That is one of the major challenges faced today due to the unsustainable exploitation of our natural resources. The Nigerian Government has implemented various strategies and sectoral policies aimed at addressing key policy issues related to combating drought and desertification. This paper evaluates the existing desertification control policies, identifies the constraints in their enforcement, and proposes recommendations for improvement. The study employs a qualitative approach, analyzing policy documents, reports, and interviews with stakeholders involved in desertification control efforts. The findings reveal that inadequate funding, lack of political will, institutional weaknesses, and poor community involvement are major obstacles to effective policy implementation. The paper concludes by recommending measures to strengthen policy enforcement, such as increased funding, enhanced capacity building, and active community participation.

Keywords

Abatement; Climate change; Desertification; Land; Natural resources; Policy enforcement

Introduction

Desertification refers to the process by which land, or more specifically soil, in arid and semi-arid regions becomes increasingly

unproductive, driven by a combination of climatic changes and human activities. Global studies show that resource-poor farming with minimal resources, especially without proper protection of land measures, results in its deterioration (OpenAI, 2025).

While desertification has significantly reduced the availability and use of farming tools, it has simultaneously contributed to the expansion and deepening of knowledge, especially in the areas of environmental awareness and conservation strategies. Over the past 25 years, various small projects implemented in different areas have generated valuable insights and practical methods, serving as important foundations to current and future desertification mitigation efforts. Likewise, the way rural populations perceive and interact with their environment is shifting, and in some regions has already undergone transformation. The environment is more frequently viewed as a delicate and fragile space that has been neglected and overexploited, requiring efforts needs efforts and promote sustainable practices and action. Encouraging rural communities are increasingly asserting their claim to land stewardship and organizing into groups, cooperatives, village development organizations, and independent local associations, signaling a positive trajectory for the future (Olagunju, 2015). The United Nations Convention to Combat Desertification (UNCCD) aimed at mitigating desertification, states that "the deterioration of land in dry, semi-dry, and slightly humid areas happens due to different reasons, such as changes in climate and human actions (Olagunju, 2015). Land degradation means a decrease in the ability of dry areas to support life. This issue impacts the lives of millions, particularly those who are most vulnerable and economically disadvantaged (LawTeacher, 2025).

Dry areas are greatly at risk due to the decrease in ecosystem services caused by water scarcity (Ministry of Environment, 2011), heavy reliance on natural resources, and climate change. The shortage of freshwater, exacerbated by changing climate patterns, is placing increasing pressure on already vulnerable arid regions (OpenAI, 2025). If left unmanaged, these pressures can lead to desert-like conditions in arid areas of sub-Saharan Africa and Central Asia (OpenAI, 2025). Arid areas are greatly impacted by this issue. Every three decades, intense droughts happen in three important parts of Africa: the Sahel, the Horn of Africa, and southeast Africa. These droughts have tripled the number of individuals experiencing severe water shortages, leading to critical challenges in food security and public health.

Desertification is the process by which land that was once fertile slowly turns into desert. Deserts can begin to form in regions that receive less than 10 inches of rain annually. Desertification primarily occurs in arid zones where the soil is already delicate, due to low organic matter, thin topsoil layers, sparse vegetation, and slow regeneration. Low rainfall and severe climates are also indicators of desertification. The global financial effects are devastating, including a decline of over $40 billion each year in farm products and rising costs of agricultural goods (Westerveld, 2011).

Climate changes increase the process of desertification; human activity, such as overgrazing, has been observed to have a direct impact on soil degradation and consequently desertification. Natural factors include climate change and drought, while human impact includes overgrazing, excessive farming, deforestation, and the pressures on resources from growing populations. A report by the UN states that nearly 30% of

the planet's land, which includes 70% of the arid areas, is influenced by drought (United Nations, 2012). Every day, approximately 33,000 people die from hunger. Individuals and communities who migrate to escape desert conditions often recreate those same conditions in new areas due to unsustainable pastoral activities, for example. Paradoxically, people are attempting to leave the desert, but their ways of using the land are making the desert follow them. The context of this study, desertification, refers to land damage in Nigeria, exploring the methods used thus far to mitigate the issues and what challenges and limitations are currently at play (UNCCD, 2022).

Below are some recorded activities perceived as primary reasons leading to desertification in sensitive areas:

- Growing plants in depleted soil or soil prone to erosion by way of wind or water;
- Decrease in the length of time that soil is left unused and absence of organic or mineral fertilizers;
- Selective overgrazing of shrubs, herbs, and grasses;
- Excessive use of wood resources, especially for firewood;
- Unregulated use of fire for regenerating pasture, hunting purposes, agricultural clearing, or resolving specific social conflicts;
- Agricultural methods that damage the soil structure, particularly through the use of inappropriate machinery;
- Agricultural practices like cash cropping, which lead to the net export of soil nutrients and subsequent loss of soil fertility;
- Mono-cropping, planting only one type of crop on the same land over time;
- Redirecting rivers to establish irrigation systems; and
- Irrigating soils that are susceptible to salinization, alkalization, or waterlogging.

One of the primary causes of desertification across the globe is overgrazing. In semi-arid regions, native plants have adapted to being consumed by widely dispersed large grazing animals that migrate in response to patchy rainfall, which is typical of these climate zones. Early human pastoralists replicated this natural system by migrating their small herds of domesticated animals based on food and water availability, which helped prevent the fragile vegetation from being overly grazed. Historically, communities would follow rain patterns for access to water and move with their livestock, accordingly, thus avoiding overuse of any area’s flora. Today, however, humans enjoy a consistent supply of food without needing constant movement. This sedentary lifestyle has led people to use fences to contain their livestock in fixed locations; such practices contribute significantly to problems related to overgrazing, as they disrupt traditional migratory patterns necessary for sustainable ecological balance (Islam *et al*., 2025).

Desertification diminishes the land's capacity to sustain life, impacting wildlife, livestock, crops, and humans alike. The decrease in vegetation that occurs with desertification results in faster soil erosion caused by wind and water (Reynolds *et al*., 2007). The impacts and harm caused by desertification include the following:

- Soil usability decreases as it becomes susceptible to being blown away by wind or eroded by rain. Wind and water can deplete the soil's nutrients, while salt accumulation makes it more challenging for plants to thrive.

- Vegetation is Absent or Damaged: Loose soil can either cover plants or leave their roots exposed. Additionally, overgrazing may lead to the loss of plant species.
- Causes Famine: Regions experiencing war and poverty are more susceptible to famine. Additionally, drought and inadequate land management also play significant roles in triggering food shortages.
- Food Loss: The soil is unsuitable for agriculture, leading to a decrease in food production. With a growing population, this could result in economic challenges and starvation.
- People near Affected Areas: Desertification can lead to flooding, reduced water quality, dust storms, and pollution. These impacts can harm individuals residing in the affected areas.

Desertification poses a significant environmental challenge in Nigeria, especially impacting the northern states of Sokoto, Kebbi, Zamfara, Katsina, Kano, Jigawa, Bauchi, Gombe, Yobe, Borno, and Adamawa (United Nations Environment Programme, 2020).The Federal Government has introduced numerous strategies to address desertification, such as creating the National Agency for the Great Green Wall (NAGGW) and enacting the 2011 National Environmental Regulations focused on Desertification Control and Drought Mitigation (National Environmental Standards and Regulations Enforcement Agency (NESREA) 2023. The impact of these policies has been restricted due to various challenges and constraints in enforcement. Numerous studies, including have underscored the difficulties faced in implementing desertification control measures in Nigeria (Abuza, 2018), this study identified key factors for the inefficiency of desertification control measures, including inadequate implementation, lack of community ownership, and an over-reliance on tree planting (Abdullahi *et al*., 2020). In a similar vein, research conducted by Usman and Mohammed (2020) highlights that the inadequate integration of sustainable practices throughout the policy cycle, insufficient participation from civil society organizations, and weak community involvement are major obstacles to effective policy enforcement.

Methodology

The analytical framework for this study combines content analysis**,** SWOT analysis, and comparative policy analysis (FMEnv, 2015). Content analysis will be employed to systematically code and interpret both documentary sources and interview transcripts, identifying recurrent themes such as policy coherence, institutional mandates, stakeholder participation, and enforcement barriers. SWOT analysis will further assist in evaluating the policy landscape by categorizing internal strengths and weaknesses, as well as external opportunities and threats that shape the efficacy of desertification control measures (FMEnv, 2011). Furthermore, comparative policy analysis will be used to benchmark Nigeria's policy instruments and implementation strategies against those of other Sahelian nations facing similar ecological threats, such as Niger and Burkina Faso, to extract lessons and best practices that could be adapted to the Nigerian context (National Aeronautics and Space Administration, 2021).

Ethical considerations are central to this research, particularly in the design and conduct of interviews (NiMet, 2020). All participants will be fully informed of the purpose of

the study and their rights, including the right to confidentiality and voluntary participation, and written or verbal consent will be obtained following ethical research standards (Oladipo, Adeyemi and Mohammed, 2018). Pseudonyms will be used to ensure anonymity, and data will be securely stored to protect the identities of respondents. Where necessary, ethical approval will be sought from an accredited institutional review board (UNCCD, 1994). By combining rigorous qualitative inquiry with policy and institutional analysis, this methodology is positioned to provide a nuanced and evidence-based evaluation of desertification control efforts in Nigeria, revealing both the systemic impediments to effective enforcement and the pathways through which policy reform might be realized.

Deforestation Discussion in the Global Context

Various strategies and actions have been designed to reduce or mitigate the effects of desertification. Key mechanisms include*:*

Planting of legumes: Plants, particularly leguminous ones, often enrich the soil and restore its fertility through this process. Plants that extract nitrogen from the air and fix it into the soil are crucial, alongside food crops and trees like grains, barley, beans, and dates. Sand fences serve as an effective means to control soil drift and sand erosion. The Fulani people prioritize grazing land and stock routes in their requests to the government (National Agency for the Great Green Wall, n.d.).

Shifting Cultivation: Shifting cultivation, which is a traditional farming method, is frequently criticized for causing deforestation; however, poor fertility necessitates this method of agriculture. The method is described as follows: a small area of tropical forest is cleared as part of the process (Oladipo and Olorunfemi, 2017), the vegetation is cut down and burned. Crops are cultivated until the soil loses its fertility, at which point farming ceases in that location and shifts to a new piece of land (UNCCD, 2022). The neglected land, left untouched for an extended period of time, allows vegetation to regrow and the natural ecosystem to be restored. Shifting Cultivations was originally practiced in harmony with nature. However, the increasing demands of a growing population have significantly reduced fallow periods. As a result, the soil cannot replenish its fertility before being used again (Ibrahim, 2020) and (Tittonell and Giller, 2013).

Timber Harvesting: Timber resources are crucial for a country's prosperity, with commercial wood readily available in both national and international markets (Ogunwusi, 2014). As a result, natural forests are being ruthlessly exploited. One major cause of deforestation in developing countries is the logging or felling of trees for timber. In tropical regions, commercial logging often targets only specific tree species that yield higher market prices (Ogunwusi and Jolaoso, 2012). This method of selectively removing a few trees from dense vegetation on fragile soil causes far more destruction than the number of trees or the volume of timber removed might indicate (Ejidike and Mbagwu, 2019). Logging methods like clear-cutting have resulted in permanent deficiencies of valuable plant species in numerous forests. Consequently, vast areas of West Africa are no longer viable for commercial logging due to the absence of essential plant species required by the logging industry. In the Philippines, populations of important tall tree groups have

dwindled dramatically from 16 million hectares in 1960 to just about one million hectares remaining, primarily in remote regions (Nwoboshi, 2019).

Cattle Ranching: Vast expanses of tropical forests in Central and South America have been cleared to create grazing land for cattle, capitalizing on the profitable beef export market to the USA. However, in these instances as well, the issue of low productivity in tropical soils renders the venture unfeasible (Audu and Linus, 2018). Over-grazing is a major environmental concern in Nigeria, particularly in the northern and central regions where pastoralism is a dominant livelihood (Akinyemi, 2017). The continuous and uncontrolled grazing of livestock has led to rapid soil degradation and severe erosion in these areas (FAO, 2019). This has reduced the land's agricultural productivity and increased desertification, especially in states such as Borno, Yobe, and Katsina. In addition, the expansion of cattle grazing routes and grazing reserves has put pressure on Nigeria's forested regions, particularly in the Middle Belt and parts of the southern states (Global Forest Watch, 2021), where increasing demand for pasture has led to deforestation (Nkonya, Mirzabaev and von Braun, 2016). This mirrors the destructive impact of cattle ranching on tropical forests seen in South and Central America, albeit on a different scale (Odihi, 2003a, 2003b). The combined effects of over-grazing and land-use change contribute significantly to Nigeria's environmental degradation, biodiversity loss, and climate change vulnerability (Akinbami, 2019). Sand fences also serve as an effective means to control soil drift and sand erosion. The Fulani people prioritize grazing land and stock routes in their requests to the government (National Agency for the Great Green Wall, n.d.).

Firewood Collection: For the majority of rural populations and a significant number of individuals residing in small towns and cities within developing countries (Aliyu, 2020), wood serves as the sole fuel source, used for cooking and heating. In sparsely wooded areas, collecting firewood significantly reduces tree cover. In contrast, dense forests generally offer abundant combustible material such as dead twigs and leaves, minimizing the need to cut down live trees in these regions (UNCCD, 2022). Despite typically being portrayed as deadwood, trees are processed in various ways. Their bark is often stripped, and living trees are carried to local markets for sale. If this current trend persists, there is a concern that within two decades, half of the Indian states with the largest forested area will be devoid of forests (Oladipo, 2019).

In many countries, particularly in lightly wooded areas, live trees are frequently cut down to satisfy the demand for firewood and charcoal. In places like Upper Volta, Sudan, and Nigeria, organized groups systematically felled these trees in expanding circles around urban centers before illegally converting them into charcoal for city markets. In Sudan specifically, armed guards are needed to protect living trees from these activities; consequently, confrontations often occur between authorities and those involved in illegal logging operations (Dabanga Sudan, 2021).

Legal Framework, Abatement Measures, and Efficacy in Nigeria

Various national and international legislative frameworks have been established to regulate, mitigate, and address the impacts of desertification. These legal instruments

aim to provide structured responses and promote sustainable land management practices. Some of the key legislations include: Nigerian Minerals and Mining Act 2007.

According to this Act, ownership and control of minerals are granted to the Federal Government. Therefore, individuals and corporations can explore or exploit these resources only by obtaining licenses and leases issued by the government (Minerals and Mining Act, 2007, s.1). Under the Act, the government has the authority to acquire any land where mineral resources in commercial quantities are discovered. It is unlawful to exploit these minerals without obtaining the necessary permits *(Minerals and Mining Act, 2007, s.69).* This Act also bans the sale of timber or forest products, including plants and vegetation, to conserve trees and flora within forests and prevent desertification. The process is as follows: upon receiving an application from a qualified applicant, the Minister for Solid Minerals Development has 45 days to potentially grant a 25-year mining license, which can be renewed every 24 years. The Act additionally forbids activities that expose soil in ways that could lead to negative environmental impacts (USAID, 2022). Nonetheless, the inadequate enforcement of this Act's provisions has allowed illegal mining activities to increase in Nigeria, resulting in both economic and environmental issues. Economically, the issue rests on the loss of royalties and other potential legitimate revenues from these resources *(Minerals and Mining Act, 2007, s.134-137).* Environmentally, harmful effects include surface and groundwater contamination, soil erosion, and fatalities due to the consumption of contaminants such as lead, cyanide, and mercury go unregulated and have now entered the food chain. By the provision of the Act (Gazette No. 40, Vol. 98, 2011) the government has the authority to acquire land where mineral resources are discovered in commercial quantities. It is unlawful to search for or exploit these resources without obtaining the necessary permit. Additionally, this Act prohibits selling timber, forest produce, plants, and vegetation to conserve trees within forests and prevent desertification or soil erosion that could lead to harmful environmental conditions *(Minerals and Mining Act, 2007, s.33)*; however, due to the ineffective implementation of this Act's provisions, illegal mining activities continue to increase in Nigeria. This situation poses a significant economic drawback as it results in the non-payment of royalties and other potential revenues from these resources. Moreover, it has severe environmental consequences: surface and groundwater contamination, gully erosion, and even fatalities caused by contaminants like lead, cyanide, and mercury being introduced into the food chain *(Minerals and Mining Act, 2007, s.119-134).*

It is further provided under the Act that any breaches of the provisions therein are punishable by the law; firstly, through the revocation of the granted license, followed by a fine of 20 million Naira. For subsequent breaches, imprisonment of not less than five years and a fine of 20,000.00 (twenty thousand naira) for every day the offence persists. *(Minerals and Mining Act, 2007, s.119-134).* Acknowledging the inefficiency of penal sanctions against illegal miners, Biodun O, the Managing Director of Nigerian Mining Corporation, Jos State, lamented that Nigeria is losing an amount of 220 billion naira to illegal miners. He advocated for a shift approach towards illegal miners, suggesting that rather than relying on arrests, which have proven ineffective, mining equipment should be provided for them and they should be encouraged to work for the government under an agreed compensation scheme. Similarly, Babatunde Fashola, then Governor of Lagos State, emphasized the environmental degradation caused by illegal sand mining. This

activity has been a significant factor in increasing the state's vulnerability to flooding and is responsible for damage to oil and gas pipelines, flood-related deaths, as well as property damage. *(Minerals and Mining Act, 2007, s.119-134).*

Land Use Act: A legislated Act contains the main law regulating land ownership and management in Nigeria. It grants authority over land to the government, with the state governors as the responsible body for allocating land for various uses (Land Use Act, 1978, ss.1–2). The Act considerably impacts environmental sustainability, especially concerning desertification in northern Nigeria. As desertification is a land-degrading process, the Land Use Act is most pertinent. This Act gives control over all state lands to the Governor (excluding those held by the Federal Government or its agencies). The Governor manages urban land allocation while local governments handle land distribution in rural areas. Conflicts often arise between communal landowners and authorities due to resentment over being required to pay rent for what they consider a "gift of nature". These disputes typically arise between original farm dwellers and estate developers or forest conservators, with each party asserting competing claims over land use and ownership (Akinola and Awotona, 2006). This Act is routinely ignored, with illegal logging continuing unchecked, causing deforestation and subsequent desertification. Offenders who are apprehended often secure their release through bribery or the involvement of corrupt government officials. Meanwhile, customary land tenure systems remain deeply influential in both rural and urban regions (Akinola and Awotona, 2006). In the case of *Centre for Oil Pollution Watch v NNPC* (2019), the Supreme Court recognized the significance of environmental protection; however, there has been no equivalent landmark decision addressing desertification. In contrast to the Nigerian Minerals and Mining Act, which requires conducting environmental impact assessments, the Land Use Act does not penalize poor environmental management, nor does it include robust measures for ensuring sustainability or tackling climate change.

National Park Service Act: This Act regulates the creation, administration, and safeguarding of national parks in Nigeria. Its objectives are to conserve biodiversity, enhance ecosystems, and prevent environmental degradation (National Park Service Act, 1999, ss.1–2). This legislation was enacted to oversee the preservation, enhancement, and protection of wildlife, plants, and other vegetation within the national parks, as well as address related concerns. However, the forest reserve is currently at risk due to dry seasons and wild bushfires (National Park Service Act, 1999, ss.21-22).

Section 9-10 of the Act provides for environmental protection and sustainable use, including afforestation (where governments plant trees on degraded farmland to restore ecological balance and reduce land degradation, for example) and wildlife protection. The park management authorities are responsible for managing the ecosystem and enforcing conservation laws. Any violation of the Act, such as illegal logging or poaching, results in penalties, including fines and imprisonment. In the case of *Oronto Douglas v. Shell Petroleum* (1999)[1], the Court emphasized the need for Environmental Impact Assessments (EIA) before industrial projects are approved. The decision of the

[1] Oronto Douglas v Shell Petroleum Development Company Ltd and Others (1999) 2 NWLR (Pt. 591) 466. Available online at: https://lawcarenigeria.com/oronto-douglas-v-shell-petroleum-development-company-ltd-ors/ (accessed on 10 July 2025).

court aligns with the Environmental Impact Assessments and the National Parks Service Act's conservation objectives. Another major challenge is the falsification of records and inadequate data, which has affected the ability of the government to understand the actual status of forest resources and the magnitude of deforestation, desertification, and species extinction confronting the region, and thus affecting the necessity to prioritize their preservation (Oronto, 1999).

The Nigerian Urban and Regional Planning Act, 2004: This Act provides a legal framework for land use planning, environmental sustainability, and urban development. It is a crucial mechanism in addressing desertification, especially in northern Nigeria, where land degradation threatens livelihoods. Sections 1-4 of this Act provide key provisions related to desertification directed at land use planning and environmental protection. It further mandates structured land use planning to prevent environmental degradation by establishing the National Urban and Regional Planning Commission to regulate urban expansion and prevent unplanned land exploitation, which also contributes to desertification. Section 13 of the Act mandates Environmental Impact Assessments to address deforestation and overgrazing, which contribute to desertification. Meanwhile, the Urban Regional Act focuses on ensuring effective and practical national planning to prevent overcrowding and adverse environmental conditions. The Act provides that:

- A registered architect or town planner will be responsible for drawing up the building plan.
- A land development application will be denied if the proposed project would negatively impact the environment or become a nuisance to the community.
- Planning needs to include tree preservation and planting to support environmental conservation (Medugu, Majid and Choji, 2008).

Disobeying a stop-work order is considered an offense with a violation resulting in a fine of up to N10,000 (Ten Thousand Naira) for individuals and up to N50,000 if the offender is a company. In many Nigerian cities, industries are established in both residential and non-residential areas, often without consideration for the environmental impact they may have. Encouragingly, community involvement in natural resources can foster collective responsibility and strengthen efforts in curbing the challenges of desertification.

National Environmental Standard and Regulations Enforcement Agency (Establishment) Act (2007): This agency is entrusted with the responsibility of conserving biodiversity and promoting sustainable development, (National Environmental Standards and Regulations Enforcement Agency, 2023). It establishes regulations that set specifications and standards to safeguard resources, to promote public health and welfare, as well as support natural development in a way relevant to the nation. Below are some examples of regulations:

I.

National Environmental (Control of Bush/Forest Fire and Open Burning) Regulations, (2011) This regulation aims to prevent and reduce the destruction of ecosystems caused by fire outbreaks and the burning of any materials. It also forbids the burning. from any bush or forest, as well as participating in activities that could potentially ignite a bush or forest

fire, unless expressly allowed by the provisions of this regulation. Individuals who have received permission to burn bushes or forests are required to inform the agency responsible for the area where the land is located about their intentions (National Environmental (Control of Bush/Forest Fire and Open Burning) Regulations, 2022, regs. 7, 22 & 23).

The main focus of these regulations, (2022) is to prevent and reduce ecosystem destruction caused by fires and the burning of materials that release harmful air pollutants. This regulation forbids any unauthorized bush or forest burning, as well as activities likely to cause such fires, unless allowed under certain conditions within this law. Individuals granted a permit for controlled burning must notify the local agency's enforcement officer responsible for managing their area beforehand. Using fire for hunting purposes is strictly forbidden. Violating these rules can lead to penalties including a fine of up to ₦5,000 or imprisonment not exceeding three months, or both, for individual offenders; corporate violators may face fines of up to ₦1,000,000 plus an additional charge of ₦20,000 per day until the offense ceases. Accordingly, sections 18-20 mandate that NESREA (National Environmental Standards and Regulations Enforcement Agency) engage in public education about bushfire dangers while encouraging community reporting of illegal burnings (Audu and Adie, 2018).

The regulation is blatantly violated with impunity, as indiscriminate bush burning remains a common practice in Nigeria. Regulation 22 allows exceptions for barbecue grills and outdoor cooking equipment, small cooking fires, and campfires. It also permits on-site burning of organic agricultural waste for subsistence farming, but excludes pesticides, plastics, or other non-organic materials unless necessary to manage invasive plant and insect species through open fire methods. However, these activities are not appropriately supervised by NESREA officials, which exacerbate the issue of uncontrolled burning that frequently impacts forest resources. It has been observed that, unfortunately, this legislation merely exists on paper since its enforcement is rarely implemented effectively (Jalama *et al*., 2020). Nonetheless, the objective of this legislation is to:

a) Develop a practical and efficient regulatory framework to ensure the sustainable use of land already impacted by desertification while safeguarding at-risk areas.
b) Educate the public about the causes and dangers linked to desertification and the resulting land degradation.
c) Promote the sustainable use of firewood by adopting more efficient and energy-saving devices, aiming to broaden their acceptance and implementation across all sectors.
d) Encourage the adoption of alternative energy sources, such as wind and solar power, briquettes, coal, gas, etc.
e) Promote reforestation, reseeding, afforestation, and conservation in regions experiencing or at risk of desertification to rehabilitate degraded lands.
f) Achieve the 25% national forest cover target set by the United Nations Food and Agriculture Organization (FAO) to become self-sufficient in wood and other forest resources. This initiative also aims to enhance ecological integrity and reduce the impacts of climate change.
g) Promote sustainable agriculture and rangeland management, enhance animal husbandry practices, and optimize water resource management in areas

susceptible to desertification. This aims to achieve sustainable livelihoods, reduce poverty, and create wealth by introducing modern yet affordable production technologies tailored for farming communities with limited resources.

h) Foster collaboration with pertinent international and non-governmental organizations by forming partnerships, sharing knowledge, and implementing conventions like the United Nations Convention to Combat Desertification (UNCCD) and Drought Mitigation, as well as the United Nations Framework Convention on Climate Change (UNFCCC), both of which Nigeria is a signatory nation, and lastly,

i) Maintain and increase regions covered by forests and trees through conservation efforts, protection measures, natural vegetation rehabilitation, tree planting initiatives, and controlled forest use. This aims to reverse the trend of desertification.

Worsening environmental conditions in Nigeria highlight the rampant, unsustainable use of natural resources. The agencies tasked with enforcing regulations are overwhelmed by the vast and complex challenges they face, leading to their inefficiency.

II.

National Environmental (Desertification Control and Drought Migration) Regulation2011 - it promotes the sustainable use of firewood by implementing efficient and energy-saving devices, aiming to enhance their adoption across various levels. This approach seeks to reduce the impact of climate change. Additionally, it includes provisions for:

- Enhancing animal husbandry and managing water resources more effectively in regions susceptible to desertification;
- Land, water, and forest resources should be utilized sustainably to enhance both their productive capabilities and natural potential,
- Best practices should be implemented in reforestation and conservation efforts within semi-arid regions and areas naturally susceptible to desertification and deforestation.

Violating this regulation results in a penalty of ₦1,000,00.00 (One Million Naira) or imprisonment for up to two years, or both. Additionally, there is an additional fine of ₦40,000.00 for each day the violation continues. Corporations found guilty face a fine of ₦5,000,000.00 (Five Million Naira), with an additional daily penalty of ₦50,000.0 as long as the infraction persists. Despite these penalties being enacted to curb illegal activities by agro-allied industries eager for economic expansion, such as unlawful deforestation to build factories that satisfy growing consumer demands, the enforcement has been largely ineffective due primarily to inadequate funding faced by the regulating Agency.

III.

National Environmental (Protection of Endangered Species in International Trade) Regulation 2011 - This regulation aims to safeguard endangered species from extinction by controlling their import, export, and any harmful activities that threaten their protection and preservation. Violating this regulation can result in a fine of

₦5,000,000.00 (Five Million Naira) or imprisonment for up to three years. Despite these penalties, unsustainable wildlife poaching remains an issue.

IV.

National Environmental (Desertification Control and Drought Mitigation) Regulation - This regulation promotes the sustainable use of wood for fuel by encouraging the adoption of efficient, energy-saving devices to increase their widespread use and integration at all levels. Its goal is to achieve a 25 percent national forest cover as recommended by the Food and Agriculture Organization (FAO) for self-sufficiency in timber and other forest resources. This includes enhancing ecological integrity and mitigating climate change impacts, (Regulations, 2011, S.I. No. 13, reg. 1(1). To achieve sustainable livelihoods, reduce poverty, and create wealth in desertification-prone areas, it is essential to implement sustainable agricultural practices and improve range management. This includes enhancing animal husbandry techniques and managing water resources efficiently. Introducing modern and affordable production technologies will support resource-poor farming communities in these efforts, (Regulations, 2011, S.I. No. 13, reg. 1(2). It is recommended that best practices be implemented in conservation efforts within semi-arid and arid regions, which are inherently susceptible to desertification and deforestation. The aim is to address these challenges while enhancing the natural ecological system, (Regulations, 2011, S.I. No. 13, reg. 12 and 13). Breaching the regulation can result in a fine of ₦1,000,000 or imprisonment for up to two years, or both. Corporate offenders face a minimum penalty of ₦5,000,000 plus an additional charge of ₦50,000 for each day the violation persists. Challenges include inefficiencies within enforcement agencies and inadequate research capabilities, along with existing gaps in policies and strategies meant to combat deforestation, droughts, and desertification (Aigbokhaevbo, 2012).

V.

National Environmental (soil erosion and flood control) regulations 2011: This regulation aims to safeguard human life and the environment by restricting or banning land-disturbing activities that pose threats to health, safety, and property. This is necessary due to water-induced erosion from increased surface run-off velocity and volume/depth. These regulations aim to mitigate any activities, including filling, grading, dredging, and any other development projects that might exacerbate soil erosion or cause flooding risks. However, enforcing these provisions has faced challenges due to ongoing human-induced issues like uncontrolled logging, clogged drains, and the sand filling of moats and swamps, contributing unrestrainedly to soil erosion and flooding challenges.

Forestry Act (1937) this Act governs the forests in Nigeria. It prohibits the indiscriminate exploitation of timber. The act constitutes certain land areas into forest reserves, and only authorized personnel are allowed to enter these conserved areas. Any unauthorized person who enters these reserves, whether to extract forest products or damage a standing tree or kindle a fire without taking proper precautions, is committing an offense under this Act. Additionally, this Act is meant it safeguard wildlife, especially species that are classified as endangered. Violating these laws upon conviction can result in a fine of

₦200, a prison sentence of up to twelve months, or both penalties. Through its provisions, sections 50 and 52 list offenses that occur within forest reserves and protected forests (Forestry Act, 1937, ss. 50 & 52). These include unauthorized extraction of forest products, illegal hunting activities, and the destruction of forestry property. Section 53 specifies that individuals found guilty of these offenses may face fines or imprisonment, or both, depending on how severe the violation is deemed to be. Sections 43 to 46 outline the powers granted to enforcement officers, such as forest management officers and police officers. Under this Act, these positions are authorized to prevent and investigate forestry-related crimes; inspect vehicles transporting forest products; seize illegally obtained goods along with any related equipment used for violations; and arrest those suspected of committing offenses against forestry laws (Forestry Act, 1937, ss. 43-46).

The challenges facing the Act include inadequate enforcement mechanisms and disproportionately weak penalties for violations. Sections of the law that lack prescribed penalties should be amended to ensure that punishments are commensurate with the offence committed. Nigeria's forestry legislation has evolved, with various laws enacted to manage and conserve forest resources. The foundational legal framework is embodied in the Forestry Law, which has undergone amendments to address contemporary challenges. Section 38 addresses the control of local government forest plantations and reserves, implying collaboration with local entities.

The Forestry Law acts as a crucial legal framework to promote the sustainable management and preservation of Nigeria's forest resources, harmonizing ecological conservation with economic growth and social progress.

Examination of International Abatement Measures

Environmental sustainability has become a core concern in international policymaking due to its implications for global ecosystems, food security, and human livelihoods. The dual challenges of biodiversity loss and desertification necessitate robust international abatement measures; below are some pertinent examples.

Convention on Biological Diversity (CBD): The necessity to protect environmental resources for both current and future generations led to the establishment of the Convention, which originated from the 1992 United Nations Conference on Environment and Development (UNCED) in Rio. However, its implementation in Nigeria has not curbed harmful bio-resource exploitation because local communities perceive government conservation initiatives as interfering with their rights to utilize natural resources (Cartagena Protocol, 2000). Nigeria seems to lack the necessary economic and social resources to effectively implement the provisions of the convention (Kunming–Montreal Global Biodiversity Framework, 2022) A plan to boost funding and address the rate of biodiversity loss by 2015 does not has yet to be established, nor is there a strategy in place to ensure that biodiversity considerations are prioritized in developmental projects (Convention on Biological Diversity (CBD), 1992).

United Nations Convention to Combat Desertification (UNCCD) (2017): An increased understanding of the complex interactions among physical, chemical, biological, and

socio-economic factors within local contexts national and global implications have heightened awareness and motivated signatories to the Convention, including Nigeria, to strengthen worldwide efforts aimed at combating desertification, a persistent and growing threat. While drought frequently triggers desertification, as aforementioned, it is largely driven by human activities such as overgrazing, unsustainable logging practices, inadequate drainage systems, uncontrolled population growth, unregulated farming methods, and rapid urbanization often occurring within fragile ecosystems. Those who are especially vulnerable to these pressures are highlighted in the report by the Food and Agriculture Organization (FAO, 2019)

The UNCCD calls on countries to strengthen existing legislation, create new laws, and develop long-term policies. However, it does not offer detailed guidance on the content or structure of such legislation and policies. Additionally, the Convention falls short in promoting bilateral and multilateral partnerships between donors and local organizations. This lack of concrete support is a key factor contributing to the difficulty many affected states face in effectively implementing appropriate legal and policy frameworks (UNEP, 2020, 2021).

Implementation Constraints on Environmental Regulations in Nigeria

The northern states of Sokoto, Jigawa, Borno, and parts of Katsina in Nigeria are facing significant environmental challenges due to drought and desertification. The country is losing approximately 315,000 square kilometers of land to the encroaching desert that is rapidly moving southwards at a rate of 0.6 kilometers per year (Millennium Ecosystem Assessment, 2005). The vegetation is gradually transitioning from grasses, bushes, and scattered trees to vast expanses of sand, resulting in over 55 percent of the land in Borno State being affected by desert encroachment (FMEnv, 2011). To address the socio-economic challenges posed by desertification and align with Agenda 21, Nigeria has initiated ecological disaster relief and shelter belt programs. These initiatives are funded either entirely by Nigeria or in partnership with bilateral and multilateral aid agencies. Established in 1989, the National Ecological Fund is managed by the presidency to support areas prone to disasters such as soil erosion, flooding, oil spills, desertification, and pollution-related events. However, this fund has faced controversies involving misappropriation of resources, diversion of funds for unintended purposes, and embezzlement issues (Mohammed, 2015).

Nigeria's failure to fully meet its obligations under the UNCCD has resulted in significant opportunity costs, contributing to its classification as a food-insecure country, due in part to the poor performance of its agricultural sector. Although numerous regulations exist to support environmental conservation, their efficacy has been limited due to several key factors, including:

a) *Lack of Data:* There is no centralized database to support information on where and when to draw the government's attention to address or mitigate land degradation that otherwise would have been ameliorated or avoided.
b) *Poor Awareness-Raising:* Many Nigerians need to be sensitized on the importance of avoiding over-cultivation of land. However, due to widespread poverty, many farmers continue to cultivate the same plots year after year, as they cannot afford to access new land (Climate Laws of the World, 2011).

c) *Liberal Penalty:* Most of the penal sanctions in environmental legislation impose lenient penalties, which tend to encourage rather than deter offenders. For large industrial infractions, in many cases, it appears more cost-effective to violate the law than to comply with it (UNEP Law and Environment Assistance Platform, 2011).

d) *Bribing of Enforcement Officers*: It is widely acknowledged that offering bribes to enforcement officials is common practice. At checkpoints, for instance, police officers often openly request and accept bribes, much to the public's disbelief. Environmental offences/violations are no exception; many enforcement agencies treat their position as opportunities for personal gain, viewing their offices as 'gold mines' rather than instruments of accountability and justice.

e) *Poor Technical Know How*: Most developing countries struggle with limited technological knowledge and minimal access to equipment and machinery. As a result, the management and early detection of desertification – crucial for curbing, mitigating, or even eliminating its harmful effects – remain inadequate. However, these challenges could be addressed through the use of satellites and computer-based monitoring systems.

f) *Land Scarcity:* Land is a vital factor of production, essential for commercial, industrial, residential, agricultural, and infrastructural purposes such as roads and railway development. However, the ever-increasing population places great pressure on land resources, leading to scarcity. This pressure is further exacerbated by abusive land use practices – such as over-cultivation and activities that promote flooding and erosion – which contribute significantly to desertification (National Agency for the Great Green Wall, n.d.)

g) *High Birth Rate*: Unlike in the past when mortality rates were high, advances in medical care and the availability of skilled health professionals have significantly reduced death rates, contributing to a corresponding rise in birth rates. While this demographic growth is a positive development, it also places immense pressure on land. Overcrowding and over-cultivation to meet food demands often lead to the use of fallow land without adequate recovery time, resulting in nutrient depletion and land degradation.

h) *Poor Funding of Agencies:* One of the major challenges in enforcement is poor funding. Most government enforcement agencies lack adequate equipment, such as monitoring vehicles, communication tools, data systems, and other logistics needed for effective operations. As a result, they often rely on crude methods, and when confronting violators, they are easily resisted and overpowered.

i) *Inconsistencies of Government Polices:* With each change in government, new policies and by-laws are introduced, often discarding those of previous administrations. This inconsistency makes it difficult for communities to stay informed or engaged, and frequently leads to the abandonment of important projects – such as erosion control initiatives – by incoming governments.

j) *Poverty:* Although the host communities are aware of the dangers of illegal logging, over-cultivation of land, and over-grazing, poverty often leaves them with no alternative but to continue harmful practices, despite the known consequences. In many rural areas, people also have no other means of cooking except using wood as fuel, further contributing to environmental degradation.

k) *Commercial Timber Harvesting*: The use of wood from timber harvesting – often for commercial purposes – has led to alarming rates of deforestation. Illegal logging activities continue to rise daily, facilitated by corrupt enforcement officials who accept bribes, allowing violators to operate with impunity. This unchecked exploitation is rapidly depleting the forests (UNEP Law and Environment Assistance Platform, 2011).

Recommendations

Based on the findings of this research, the following abatement measures are recommended as globally recognized practices for addressing the challenges of desertification and natural resource degradation.

a. *Reforestation*: Deforestation and desertification are directly linked and contribute significantly to extreme poverty. This underscores the need to educate local populations about the dangers of deforestation and, where possible, engage them through employment in growing seedlings to be transplanted to severely deforested local areas during the rainy season.
b. *Contour Trenching:* This technique involves the digging of trenches approximately 150 meters long and 1 meter deep. These trenches are aligned parallel to the contour lines of the landscape, which helps prevent water from flowing directly through them and causing erosion. Stone walls are constructed around the trenches to keep them from collapsing or closing up over time.
c. To enhance coherence and effectiveness in addressing interconnected environmental challenges, it is essential to promote stronger alignment between the Convention on Biological Diversity (CBD), the United Nations Convention to Combat Desertification (UNCCD), the Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC), and the United Nations 2030 Agenda for Sustainable Development, particularly its Sustainable Development Goals (SDGs). This includes harmonizing targets, indicators, and reporting frameworks across these global agreements to ensure synergistic action, reduce duplication, and maximize co-benefits for biodiversity, climate resilience, land restoration, and sustainable development. Such integration will support more holistic and impactful policy implementation at both national and international levels.
d. Ban the export of logged wood until a minimum of 25% forest reserve cover is restored and maintained.
e. Provide a policy and institutional framework favorable for private investment in trees and forest resource management while increasing community participation in forest management and utilization.
f. Encourage afforestation with species that provide other forest products such as fruits, gum, etc., as an incentive to community participation in afforestation programs, and promote agro-forestry with multi-purpose tree species to diversify farm produce and improve soil health;
g. Encourage private sector industrial plantations, especially in already degraded forest estates.
h. Adopt a protection forestry development strategy which includes shelterbelt establishment, afforestation of eroded sites, stabilization of dunes, etc.

i. Promote community woodlots, which could include forest fruit trees and fuel wood plantations, by improving the efficiency of the use of wood fuel.
j. Manufacturing affordable biomass stoves and developing alternative sources of energy, such as solar energy.
k. Support research in conservation and improvement of soil, genetic resources, utilization of forest products, agro-forestry, wildlife management, and afforestation of vulnerable regions.
l. Encouraging inter-sectoral collaboration between forestry and related productive sites means promoting stronger partnerships, joint planning, and shared innovation between the forestry sector and other sectors that are directly or indirectly connected to land use, natural resources, or rural economies.
m. Strengthen planning, monitoring, and evaluation technology and mechanisms, and support human resources development.

Conclusion

Desertification is a serious and complex problem that affects not only the environment but also the lives and livelihoods of millions, especially in Nigeria and other dry regions. Changes in climate, such as longer droughts and reduced water availability, combined with harmful human activities like overgrazing, deforestation, and poor land management, have sped up the loss of fertile soil and turned productive land into desert. Even though the government has introduced policies and agencies to tackle this issue, enforcement remains weak and community involvement is often limited. This shows that desertification is not just about the environment, it is deeply connected to social and economic challenges that need careful and coordinated solutions that respect both nature and the needs of local people.

There is hope in the growing awareness and active participation of rural communities in protecting their land. Over time, people living in affected areas have begun to see their environment as fragile and in need of care, which has led to the formation of groups focused on sustainable farming and conservation. Practices like planting nitrogen-fixing legumes, controlling soil erosion with sand fences, and adapting traditional farming methods show promise when combined with modern science. The real challenge is making sure these efforts are supported by policies that include and empower communities, while addressing bigger issues like poverty and population growth that put pressure on the land. In the end, solving desertification requires looking at the problem from many angles. It means improving government capacity, involving local people in decision-making, and ensuring that laws are enforced fairly and effectively. It also means finding creative ways to offer alternatives to harmful practices like illegal mining and deforestation, so people have better options for their livelihoods. Only by bringing together science, policy, and community action can we stop the cycle of land degradation and build a future where both people and nature can thrive in dry land regions.

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Authors' Declarations and Essential Ethical Compliances

Authors' Contributions (in accordance with ICMJE criteria for authorship)

Contribution	*Author 1*	*Author 2*
Conceived and designed the research or analysis	No	Yes
Collected the data	No	Yes
Contributed to data analysis & interpretation	Yes	Yes
Wrote the article/paper	Yes	Yes
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Research involving human bodies or organs or tissues (Helsinki Declaration)
The author(s) solemnly declare(s) that this research has not involved any human subject (body or organs) for experimentation. It was not clinical research. The contexts of human population/participation were only indirectly covered through literature review. Therefore, an Ethical Clearance (from a Committee or Authority) or ethical obligation of Helsinki Declaration does not apply in cases of this study or written work.

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The author(s) solemnly declare(s) that this research has not involved any animal subject (body or organs) for experimentation. The research was not based on laboratory experiment involving any kind animal. The contexts of animals were only indirectly covered through literature review. Therefore, an Ethical Clearance (from a Committee or Authority) or ethical obligation of ARRIVE does not apply in cases of this study or written work.

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The author(s) solemnly declare(s) that this research has not involved the plants for experiment and field studies. Some contexts of plants are also indirectly covered through literature review. Thus, during this research the author(s) obeyed the principles of the Convention on Biological Diversity and the Convention on the Trade in Endangered Species of Wild Fauna and Flora.

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The author(s) solemnly declare(s) that this research has not directly involved any local community participants or respondents belonging to non-Indigenous peoples. Neither this study involved any child in any form directly. The contexts of different humans, people, populations, men/women/children and ethnic people were only indirectly covered through literature review. Therefore, an Ethical Clearance (from a Committee or Authority) or prior informed consent (PIC) of the respondents or Self-Declaration in this regard does not apply in cases of this study or written work.

PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)
The author(s) has/have NOT complied with PRISMA standards. It is not relevant in case of this study or written work.

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